

Abstract

A fluorescent optical imaging system (10) produces two separate spots ( $S_1$  and  $S_2$ ) on a sample (12) by a pair of excitation laser beams ( $B_1$  and  $B_2$ ) that are generated by first and second lasers ( $L_1$  and  $L_2$ ). Excitation laser beams ( $B_1$  and  $B_2$ ) pass at slightly different angles, first through an aperture (15) of a 45° fold mirror (13), and then through an objective element (14). As a result, emission light beams (16, 18) are generated from each illuminated spot ( $S_1$  and  $S_2$ ) and are reflected and redirected by mirror (13) through a secondary lens (19) before reaching one of two detectors (PMT 1 and PMT 2). Emission beam (16) reflects off a second 45° mirror (22) prior to reaching detector (PMT 1), while emission beam (18) travels directly to (PMT 2). If desired, optical separation elements (24), such as dichroic filters, prisms, or gratings, can be positioned in front of each detector (PMT 1 and PMT 2). Fluorescent optical imaging system (10) may employ a scanning system (17) for illuminating and imaging the entire area of sample (12).